

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

OF THE

COLLEGE OF AGRICULTURE AND
MECHANIC ARTS

WEST RALEIGH

FEEDING EXPERIMENTS WITH BEEF CATTLE

N. C. COLLEGE OF AGRICULTURE AND MECHANIC ARTS

THE NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

UNDER THE CONTROL OF THE

TRUSTEES OF THE A. & M. COLLEGE

GOVERNOR W. W. KITCHIN, *ex-officio* Chairman, Raleigh

C. W. GOLD.....	Raleigh	M. B. STICKLEY.....	Concord
E. M. KOONCE.....	Jacksonville	T. T. BALLINGER.....	Tryon
T. E. VANN.....	Como	N. B. BROUGHTON.....	Raleigh
D. A. TOMPKINS.....	Charlotte	O. L. CLARK.....	Clarkton
J. O. ELLINGTON.....	Fayetteville	EVERETT THOMPSON...	Elizabeth City
W. E. DANIEL.....	Weldon	R. H. RICKS.....	Rocky Mount
W. H. RAGAN.....	High Point	O. MAX GARDNER.....	Shelby
W. B. COOPER.....	Wilmington	M. L. REED.....	Asheville

STATION STAFF

D. H. HILL, President of the College

C. B. WILLIAMS.....	Director and Agronomist
W. A. WITHERS.....	Chemist
F. L. STEVENS.....	Vegetable Pathologist and Bacteriologist
J. S. JEFFREY.....	Poultryman
F. C. REIMER.....	Horticulturist
R. S. CURTIS.....	Animal Husbandman
G. A. ROBERTS.....	Veterinarian
R. I. SMITH.....	Entomologist
J. D. CECIL.....	Animal Pathologist
W. C. ETHERIDGE.....	Associate Agronomist
B. J. RAY.....	Assistant Chemist
A. R. RUSSELL.....	Assistant in Field Experiments
F. W. SHERWOOD.....	Assistant Chemist
L. R. DETJEN.....	Assistant Horticulturist
GUY WEST WILSON.....	Assistant in Vegetable Pathology
T. B. STANSEL.....	Assistant Bacteriologist
A. F. BOWEN.....	Bursar
LOULA V. SHERWOOD.....	Secretary and Stenographer

The Bulletins and Reports of this Station will be mailed free to any resident of the State upon request.

Visitors are at all times cordially invited to inspect the work of the Station, the office of which is in the new Agricultural Building of the College.

Address all communications to

N. C. AGRICULTURAL EXPERIMENT STATION,

WEST RALEIGH, N. C.

TABLE OF CONTENTS.

	PAGE
Summary	27
Beef Cattle Industry of North Carolina.....	29
Objects of Experiment.....	30
Plan of Experiment.....	30
Barn, Lots and Water Supply.....	31
Description of Steers.....	31
Weights of Steers.....	32
Shrinkage	32
Kind of Feeds Used.....	32
Valuation of Feeds.....	32
Amount of Cottonseed Meal Fed.....	33
Method of Feeding.....	34
Preliminary Feeding	35
Summary of Two Years Work.....	36
Average Daily Gain per Steer by Months.....	38
Dressing Percentages	39
Financial Statement	39
Discussion of Results.....	43

SUMMARY.

The feeding of beef cattle can be made profitable in this State, especially during the winter months. While large profits can not be obtained usually, the industry furnishes a means of using the cheaper rough feeds on the farm and obtaining the feeding value of cottonseed meal before it is used as a fertilizer.

The length of the feeding period is limited because of the harmful effect of cottonseed meal when fed in quantities sufficient to produce large gains. The most profitable feeding period will range from one hundred to one hundred and twenty days, the exact length of time depending upon the amount of cottonseed meal fed daily.

The average daily feed of cottonseed meal for two and three year old steers should be about seven pounds per animal. The average daily feed used in these experiments, including the preliminary period, was 7.30 pounds per animal the first year and 6.82 pounds the second year.

The average amount of cottonseed meal fed during the two years to produce a pound of gain was 5.71 pounds for lot 1, fed corn silage and corn stover for roughage; 5.77 pounds for lot 2, fed corn silage for roughage; and 5.17 pounds for lot 3, fed cottonseed hulls for roughage. These figures show that it took less cottonseed meal to produce a pound of gain when fed with cottonseed hulls than when fed with either corn silage or corn stover.

The average daily gain for the two years was largest with the steers fed cottonseed meal and cottonseed hulls. The average daily gains made by the steers fed cottonseed meal, corn stover and corn silage, and cottonseed meal and corn silage were approximately the same each year.

The cheapest gains were made the first year by the steers fed cottonseed meal and corn silage. In the second year the steers fed this ration made cheaper gains than any of the others, either the first or second year of the experiment. The cost of gain should not be confused with the final profits, which are influenced by the quality of the steers and the selling price per pound.

The second cheapest gains during the first year were made by the steers fed cottonseed meal and cottonseed hulls and during the second year by those fed cottonseed meal and corn silage. The most expensive gains were made both years by the steers fed cottonseed meal, corn silage and corn stover.

While the steers fed cottonseed meal and cottonseed hulls made somewhat larger and cheaper gains during the second year, their dressing percentage was two and one-tenth per cent lower than the steers fed cottonseed meal and corn silage, and two and two-tenths per cent lower than the dressing percentage of the steers fed cottonseed meal, corn silage and corn stover.

The parties handling these steers reported them much better as a whole than most of those sold on the local market. The special criticism made, however, was that the steers fed cottonseed meal and cottonseed hulls were inferior in cutting qualities to either of the other two lots.

The cost of the gains was rather high with all the steers both years; however, the gains made by the feeders of this State in general will usually cost as much

or more. The high cost of gains on the experimental cattle was partially the result of using a grade of steers inferior in breeding and gaining qualities although the cattle as a whole were better than the average grade of cattle fed in the State. High grade feeders properly fed should make double the gains made by these steers, which would reduce the cost of gains one-half.

The average cost of the gains per hundred pounds for the two years was \$17.55 for lot 1, \$15.56 for lot 2, and \$15.13 for lot 3.

The average profit per steer for the two years, including the manure, was \$4.36 for lot 1, \$7.99 for lot 2, and \$4.44 for lot 3. These results show that corn silage is an excellent feed for fattening beef cattle. It not only made a larger profit per steer but produced a better quality of meat than did the other feeds.

The average price per hundred pounds live weight necessary during the two years to clear the total cost of the finished steers was \$6.08 for lot 1, \$5.78 for lot 2, and \$5.99 for lot 3. The average price actually obtained was \$5.82 for lot 1, \$5.87 for lot 2, and \$5.73 for lot 3.

The cattle fed corn silage both years returned slightly more than necessary to balance the original cost of the steers and the feed consumed without considering the value of the manure. This was true with only one other lot of steers. During the first year, the cattle fed cottonseed meal and cottonseed hulls returned just enough to balance the transaction without counting the value of the manure. In every other case there was a slight loss, although when the value of the manure was considered each lot made a satisfactory financial showing.

Steers intended for feeding purposes should be at least two years old and should weigh preferably 900 to 1,000 pounds in order to fatten satisfactorily in the short feeding period necessary when fed on cottonseed meal. This is, especially true of cottonseed meal because of its high nitrogen content. A feed of this character when fed to immature animals will prolong their growing period, consequently the advantage of feeding heavier cattle which have reached maturity.

As the results obtained in these experiments seem to favor the use of corn silage for fattening beef cattle, it is important that the feeder save a portion of his corn crop in the form of silage. It is not good business policy for the feeder to buy cottonseed hulls at the present prices to replace this roughage, which can be produced on the farm; especially so when it is considered that it will give equal or better results than cottonseed hulls.

It is necessary to have a margin of \$1.50 to \$1.75 per hundred pounds live weight to insure satisfactory financial returns on beef cattle. During the first year the margin on the steers used in this experiment was \$1.75 per hundred pounds and the second year \$1.375 per hundred pounds.

FEEDING EXPERIMENTS WITH BEEF CATTLE

BY R. S. CURTIS.

Beef Cattle Industry of North Carolina.

The feeding of beef cattle in North Carolina will undoubtedly become an important industry. In the western portion of the State, the mountain pastures afford excellent grazing where already very desirable types of feeding cattle are being produced. With the advent of better bred sires to use on the common cattle of that region and the improvement of the pasture lands by better management the industry is sure to develop rapidly. Prominent cattle growers state that a large percentage of the desirable grazing land is not at present utilized for pasturage purposes. Not only will the area be extended into the more remote parts, but the quality of the pastures will be improved by better methods of management.

The writer mentions North Carolina especially because the western section of the State is typical of the Appalachian region for cattle grazing purposes. The production of feeding cattle is not limited to this State alone, as Virginia and Tennessee, especially, can produce types of cattle equally as desirable, and within reach of the cattle feeders of this State. Virginia is using to a large extent her own cattle for feeding purposes and also the larger and better cattle of eastern Tennessee and western North Carolina. This is a condition which should receive the attention of the more progressive stockmen of this State. North Carolina feeders should feed all of the cattle produced in the State and, if necessary, draw on the surrounding States for surplus needs.

It need not be stated that cottonseed meal is the only commercial concentrate which at present can be used for feeding beef cattle. The cattle feeding industry furnishes a means of obtaining both the feed and fertilizer values from this commercial product and for this reason every effort should be made to use as much cottonseed meal in our live stock and general farming industries as conservative business methods will permit. It has not been definitely determined just how much cottonseed meal is most profitable for feeding beef cattle, but it is likely that the concentrated portion of the ration will consist largely of cottonseed meal for an indefinite period. Knowing the approximate quantity of cottonseed meal which will form a safe and satisfactory ration, the writer has confined his work of the last two years in determining the most profitable roughage feeds to use with the meal.

The chief roughages available in this State are corn stover, corn silage, and cottonseed hulls. Others of local importance could be named, but it is considered that these three are the most important from the standpoint of economy in beef production. As beef cattle do not return large profits in the South it is necessary to confine the roughage part of the rations to the less valuable feeds produced on the farm.

These experiments are based upon the fact that large quantities of corn stover are wasted annually, that corn preserved as corn silage is the most economical method in saving the crop and that corn silage is rapidly coming into favor as a beef cattle feed. Cottonseed hulls, though recognized as important, are becoming more expensive each year, and from the evidence obtained at this Station and elsewhere they are not as satisfactory for roughage as corn stover or corn silage. It is not a judicious practice to use costly commercial feeds to replace corn silage and corn stover which can be produced on every farm:

Objects of Experiment.

The objects of the experiment were to determine the difference in the feeding value of corn stover, corn silage, and cottonseed hulls when fed with cottonseed meal. This determination included the following:

1. The average daily gains.
2. The quality of the carcass.
3. The economy of production.

The last factor is really the most important to the feeder, yet the quality of the carcass influences the selling price of cattle to a marked extent. This proved to be of special importance in this case.

Plan of Experiment.

The experiment was planned with the idea of making a comparison of corn stover, corn silage and cottonseed hulls as roughage feeds. The same quantity of cottonseed meal was fed to each of three lots of steers. When an increase was made for one lot, the same increase was made for each of the other two lots. The aim was to feed as much meal as possible for best results. Conditions were made as nearly the same for each lot of cattle as possible, the only variation being in the kind and quantity of roughage given.

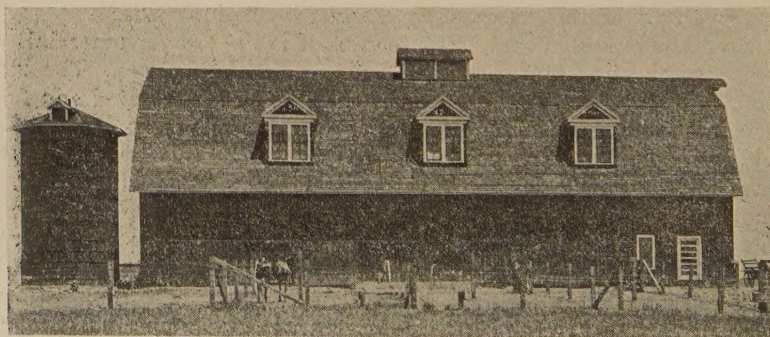


FIG. 1—Station Beef-Cattle Barn.

In making an increase or changing the proportions of roughage feeds, due consideration was given the individual appetite of the steers, allowing them to direct rather than to follow any special scheme of feeding the roughage. At all times, however, judgment was used in withholding an undue increase of any part of the rations and especially was this true in the preliminary feeding period.

Barn Lots and Water Supply.

The steers were fed in the barn, shown in Fig. 1. The stalls were located on the south side and were fifteen feet wide by twenty feet long. They were connected with lots twenty feet wide by eighty feet long. The steers were kept in the stalls during the night and a large part of the day. Water was furnished from a supply tank. This system of close housing was followed primarily for the purpose of conserving the manure, otherwise the steers would have been given the free use of the lots. While the barn was closed on all sides, it was well ventilated so that the steers always had comfortable and healthy surroundings. Bedding was supplied in the stalls and lots in quantities sufficient to retain the manure and keep the lots in a dry condition, which was sometimes difficult during rainy weather.

Description of Steers.

The steers used in the experiments were purchased in western North Carolina, and were taken directly from the pasture and started on fattening feeds at the Station farm. They were fairly uniform in size and type, averaging about nine hundred pounds in weight both years. They were principally Shorthorn grades, although some showed traces of other blood. On the whole, they would class as average feeders in the Southern States. They were quite superior, however, to the general run of steers brought from the mountains by the farmer feeders in this State. The type of the steers used is shown in Figs. 2, 3, 4, 5, 7 and 9.



FIG. 2—Steers fed cottonseed meal, corn stover and corn silage in 1909-1910.

The first year the steers were somewhat heavier and on the whole they were more uniform in size and type, however, the difference was not marked. One lot used the last year, averaged just one-half pound under nine hundred, while the other five lots averaged somewhat more. The size and type was as uniform as could be expected.

In making the division the steers were separated into three lots of quite uniform size, type and weight.

Weights of Steers.

During the experiment the steers were weighed each week about eight in the morning before any feed or water had been given. The initial weight for each lot was derived by taking the average of two weighings made on consecutive mornings. The final weights used were those taken by the buyer of the steers.

Shrinkage.

The average shrinkage on steers coming from the mountains of this State will be from seven to eight pounds per hundred pounds live weight. This will usually be regained in six to eight days as a large amount of the loss in weight is due to fill. The steers used in the experiments were allowed to regain their original weight before any experimental data were recorded.

Kind of Feeds Used.

The cottonseed meal used was the ordinary commercial product. No effort was made to secure a better grade of meal than is actually used by the farmer feeders. The only requirement regarding the meal was that it measure up to the standard required by the State.

The roughage feeds used consisted of corn stover, corn silage and cottonseed hulls. The quality of the corn stover and the corn silage was somewhat better during the second than the first year, while the cottonseed hulls were practically of the same grade both years. During the first year the corn stover was very dry and contained considerable dust, while the corn silage was inferior principally because of the small number of ears on it. In the second year, the corn stover was cured somewhat better, not being so dry and dusty; while the corn silage was superior principally because of the larger number of ears it contained.

In table 1 is shown the average composition of the feeds used in the experiment.

TABLE 1—SHOWING THE AVERAGE PERCENTAGE COMPOSITION OF FEEDS USED IN EXPERIMENT.

Feeds Used.	Water.	Dry Matter.	Ash.	Protein.	Carbo-hydrates.	Fat or Ether Extract.
Cottonseed meal ¹	8.0	92.0	6.5	41.1	35.4	9.0
Cottonseed hulls ²	11.1	88.9	2.8	4.2	79.7	2.2
Corn stover ³	40.5	59.5	3.4	3.8	51.2	1.1
Corn silage ⁴	73.6	26.4	2.1	2.7	20.7	0.9

¹ North Carolina Experiment Station chart by C. B. Williams.

² Feeds and Feeding—Henry, page 567—tenth edition.

³ Feeds and Feeding—Henry, page 563—tenth edition.

⁴ Feeds and Feeding—Henry, page 572—tenth edition.

Valuation of Feeds.

The feeds used were rated per ton as follows: cottonseed meal \$30.00, cottonseed hulls \$8.00, corn silage \$2.75, and corn stover \$8.00.

The average price of cottonseed meal throughout the last two years has been about \$30.00 per ton. Considering that neither the corn silage nor the corn stover were up to standard either year, the writer considers this a liberal estimate on these feed values.

Amount of Cottonseed Meal Fed.

While the average amount of cottonseed meal fed daily each year was about the same, as will be seen from table 2, the increase was not so rapid the first year as the second, and the total quantity fed during the last few weeks of the feeding period during the first year was greater than the amount fed during the corresponding period the second year. Practically the same amount of meal was fed per steer each year, but the distribution was different. In each case, however, the amount fed at first was very small, and gradually this was increased to a full ration. There was no evidence at any time during the feeding periods that the cottonseed meal had any detrimental effect on the steers unless it was the decreased gains which came toward the last. This, however, is a natural condition during the latter stages of fattening with all feeds, although it is true to a greater extent with cottonseed meal than with other feeds.



FIG. 3—Steers fed cottonseed meal and corn silage in 1909-1910.

The amount of cottonseed meal that may be fed most profitably will be discussed in a subsequent bulletin. The writer is working on this problem and considers it an important field for experimental work. In table 2 is shown the average amount of cottonseed meal which was fed daily to each of the steers in the three lots.

TABLE 2—SHOWING THE AVERAGE AMOUNT IN POUNDS OF COTTONSEED MEAL FED PER STEER BY MONTHS, INCLUDING THE PRELIMINARY PERIOD.

Periods.	In 1909-1910.			In 1910-1911.		
	Lot 1.	Lot 2.	Lot 3.	Lot 1.	Lot 2.	Lot 3.
First month.....	3.23	3.23	3.23	4.96	4.96	4.96
Second month.....	7.57	7.57	7.57	7.32	7.32	7.32
Third month.....	8.40	8.40	8.40	7.50	7.50	7.50
Fourth month.....	10.00	10.00	10.00	7.50	7.50	7.50
Average.....	7.30	7.30	7.30	6.82	6.82	6.82

Method of Feeding.

The steers were fed regularly twice each day, at seven in the morning and four in the afternoon, except on weighing days when they were fed somewhat later in the morning than usual. The corn silage for lots 1 and 2 was first put in the feed troughs and distributed uniformly, after which the cottonseed meal was spread over and thoroughly mixed with the silage. These rations were consumed very readily when prepared in this manner. It was quite noticeable that they were always eaten by the steers before they left the trough while the lot getting cottonseed hulls as roughage invariably left an appreciable quantity, returning later in the day to consume the remaining portion.

The corn stover for lot 1 was put in the feed racks after the meal and silage had been fed. Usually this was not all taken until quite late in the day, the steers eating it at liberty after the meal and silage had been consumed. Lot 2 received no dry roughage; however, the larger quantity of silage given seemed to satisfy the steers quite well. The cottonseed hulls fed to lot 3 were placed in the trough, and the cottonseed meal was then spread uniformly over the hulls and the two feeds thoroughly mixed. All the rations seemed to be very palatable, however this was especially true when silage formed part of the feed.



FIG. 4—Steers fed cottonseed meal and cottonseed hulls in 1909-1910.

In every case where there was a tendency to leave any of the rations, they were reduced until the quantity fed was taken readily. In this way the appetite of the steers was always kept keen. In table 3 is shown the average amount of each feed used per steer in the daily ration. Any one of these combinations forms a well balanced ration, as the feeds are all of such a composition that the shortage of a nutrient in one is balanced by an excess of this nutrient in the other. For example, cottonseed meal is high in protein and low in carbohydrates, while cottonseed hulls are low in protein and high in carbohydrates. The same condition is true with the other roughage feeds used in combination with cottonseed meal.

TABLE 3—SHOWING THE AVERAGE AMOUNT OF FEEDS USED IN THE DAILY RATION PER STEER DURING THE EXPERIMENT.

Feeds.	In 1909-1910.			In 1910-1911.		
	Lot 1.	Lot 2.	Lot 3.	Lot 1.	Lot 2.	Lot 3.
Cottonseed meal.....	8.14	8.14	8.14	6.77	6.77	6.77
Cottonseed hulls.....			17.92			21.60
Corn stover.....	16.52			20.80		
Corn silage.....	23.17	35.36		23.64	32.55	

The first year each steer in lot 2 was fed in addition to the regular ration 405 pounds of corn stover and in lot 3, 467.5 pounds of corn silage during the first twenty-five days of the experiment. This was done to overcome any detrimental effect in changing from succulent feeds to dry feeds or vice versa. This practice is not absolutely necessary, but to safeguard against getting the digestive system out of order it is not an unwise practice.

Preliminary Feeding.

Both years each of the three lots of cattle was given a short preliminary feeding period so that the experimental feeding did not start with the initial feeding period. The first year fourteen days were allowed for the steers to regain their normal condition. In the second year, however, only four days were allowed which was just sufficient for the steers to regain their original weight. During the preliminary period the steers were fed principally on roughages, such as corn stover, oat hay and a small amount of silage. A very small amount of corn and wheat bran was fed the first year. This was done principally to improve the appetite and give each lot of cattle the same chance when the experimental rations were started.

The cost of the preliminary feeding is not included in the experimental data showing the difference in the economy of each roughage. The financial statements are based on the final feeding period, and do not include the cost of the preliminary feeding.

Table 4 gives a summary of the important factors involved in the experiments during the two years.

TABLE 4—GIVING SUMMARY OF RESULTS DURING TWO YEARS WORK WITH BEEF CATTLE.

	November 6–February 26, 1909–1910— 112 days.			October 12–January 31, 1910–1911— 112 days.		
	Lot 1.	Lot 2.	Lot 3.	Lot 1.	Lot 2.	Lot 3.
	Cottonseed Meal, Corn Stover, Corn Silage.	Cottonseed Meal, Corn Silage.	Cottonseed Meal, Cottonseed Hulls.	Cottonseed Meal, Corn Stover, Corn Silage.	Cottonseed Meal, Corn Silage.	Cottonseed Meal, Cottonseed Hulls.
Initial value per hundred	4.00	4.00	4.00	4.50	4.50	4.50
Average initial weight	917.6	922.	946.7	915.6	915.2	899.5
Average final weight	1064.3	1072.9	1107.1	1061.5	1053.	1062.5
Total gain per steer	146.7	150.9	160.4	145.9	137.8	163.0
Average daily gain per steer	1.31	1.35	1.43	1.30	1.23	1.45
Average daily feed per steer						
Cottonseed meal—Experimental period	8.14	8.14	8.14	6.77	6.77	6.77
Corn stover	16.52			20.80		
Corn silage	23.17	35.36		23.64	32.55	
Cottonseed hulls			17.92			21.60
Average amount of feed used per pound of gain						
Cottonseed meal	6.21	6.04	5.69	5.20	5.50	4.65
Corn stover	12.61			15.93		
Corn silage	17.60	26.24		18.14	26.45	
Cottonseed hulls			12.52			14.90
Cost per hundred pounds gain	17.94	16.02	16.07	17.17	15.11	14.19
Valuation of steers per hundred	5.75	5.75	5.75	5.90	6.00	5.72½
Profit per steer	6.74	9.20	8.58	1.99	6.79	.31

Summary of Two Years Work.

The results of the two years experimental work in feeding steers are given in table 4. The total gains made by each lot were on the whole very satisfactory, yet it is hoped that by using a better grade of steers in the future, considerable improvement can be made in this respect. The average daily gains made by the steers fed cottonseed hulls as roughage were larger each year than the gains made by the other two lots. While it seems evident that cottonseed hulls will produce very satisfactory gains, the quality of the carcass was not as desirable, nor was the dressing percentage as high as that for the two lots receiving silage and stover.

The average daily gains made by lots 1 and 2 were practically the same. It will be noticed in table 4, comparing the results of the two years work, that it took less cottonseed meal to produce a pound of gain on cattle when fed with cottonseed hulls than when fed with corn silage or corn silage and corn stover combined. The cost per pound of gain is very high, which is accounted for first, by the class of steers fed, and second, by the high cost of the cottonseed meal and hulls. If these



FIG. 5—Steers fed cottonseed meal, corn stover and corn silage in 1910-1911.

results are compared with the cost of gains on steers fattened in the corn belt it will be seen that the figures given in the table are very high. If the average daily gains are compared it will be found that the steers used in these experiments made approximately one-half the daily gains made by the class of cattle ordinarily used in the corn belt. It is evident, however, that if cottonseed meal remains at its present price, the cost of fattening steers will necessarily be high. This will necessitate a margin

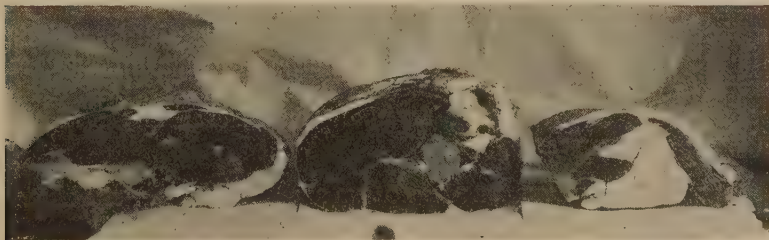


FIG. 6—Sirloin, round and porterhouse cuts from steers fed cottonseed meal, corn stover and corn silage in 1910-1911.

of at least \$1.50 per hundred pounds live weight to assure feeders satisfactory results. It is possible, however, to reduce the cost of gains to a considerable extent by using a grade of steers which will take on larger daily gains.

During the first year the steers were all sold at the same price. Even under these conditions, however, it will be seen that the steers fed corn silage made a larger individual profit than any of the other lots, either the first or second year. While the steers were all sold at the same price

the first year, the silage fed ones were finished better, having that firm touch characteristic of animals in good order. The lot fed cottonseed hulls was not as smooth, having more of the harsh rough handling quality which is often caused by a dry, unpalatable ration. While this ration was apparently relished, the large amount of crude fiber and its lack of succulence no doubt rendered it less digestible and consequently less efficient in producing a carcass of the best quality. A careful examination of the three lots shown in Figs. 2, 3 and 4 will show a marked difference in their condition. The hair and hide of lot 1 is dry, rough, and the steers appear to be unfinished. Lots 2 and 3 are smoother, the hair is in much better condition and the animals, as a whole, are in higher order. These observations were confirmed by the slaughter tests, made the second year. According to lots, the steers ranked in quality and finish as follows: first, lot 2, fed corn silage; second, lot 1, fed corn silage and corn stover; and third, lot 3, fed cottonseed hulls. While the distinction in price was not made the first year, the rank of the cattle in quality and finish was approximately the same as the rank given in the second year.

Average Daily Gain per Steer by Months.

The table showing the average daily gains of each lot by one month periods includes the preliminary period in the weights for the first month. The variation in gain is quite marked in this period, however, with one exception, the subsequent weights were fairly uniform. Lot 2 during the second year and the second month of the feeding period made a low average gain, and then dropped to slightly over one pound the third month. Taking the averages for each year, however, the results are very uniform. The lot fed corn silage as roughage has the lowest average daily gain for the two years and the lot fed cottonseed hulls as roughage has the highest average daily gain for the two years. The first year the average daily gain for lot 3 during the third and fourth month is given for the two months combined on account of a necessary omission in the weight of this lot the third month. Table 5 gives the average daily gains by months for the steers in each of the three lots fed during the two years.

TABLE 5—SHOWING AVERAGE DAILY GAINS PER STEER BY MONTHS FROM BEGINNING OF EXPERIMENT.

PERIOD.	AVERAGE DAILY GAINS PER STEER.					
	In 1909-1910.			In 1910-1911.		
	Lot 1.	Lot 2.	Lot 3.	Lot 1.	Lot 2.	Lot 3.
First month.....	1.07	1.80	1.77	.73	.33	1.23
Second month.....	1.22	.98	1.49	1.24	2.10	1.90
Third month.....	1.86	1.51	} 1.57 }	1.45	1.05	1.20
Fourth month.....	.66	1.04		1.80	1.43	1.48
Average.....	1.31	1.34	1.43	1.30	1.23	1.45

Dressing Percentages.

The dressing percentages are given for the last year of the experiment only. Conditions would not permit obtaining this data the first year. The results secured during the second year, however, are quite striking. The average dressing percentage of the steers fed cottonseed hulls was 51.7 per cent; those fed corn silage dressed 53.8 per cent; and those fed corn silage and corn stover dressed 53.9 per cent.

The cattle fed corn silage were pronounced by three different parties to be the best, with a comparatively small difference between this lot and the cattle fed corn stover and corn silage.

The butcher reported the beef from the steers fed on corn silage to be the best, with a slight distinction between this lot and the lot fed corn stover and corn silage. The chief comments made by the butcher were that lots 1 and 2 cut to better advantage, giving a larger proportion of high grade cuts, both from the standpoint of quantity and quality. His patrons pronounced the meat to be of excellent grain and flavor.

In table 6 is given the dressing percentages of each steer used during the second year of the experiment, also the average dressing percentage for each of the three lots of cattle.

TABLE 6—SHOWING THE DRESSING PERCENTAGES OF STEERS FED IN THREE LOTS ON DIFFERENT RATIONS DURING 1910-1911.

Steer No.	Lot 1.			Lot 2.			Lot 3.		
	Cottonseed Meal, Corn Stover, Corn Silage.			Cottonseed Meal, Corn Silage.			Cottonseed Meal, Cottonseed Hulls.		
	Final Gross Weight.	Dressed Weight.	Dressing Percentage.	Final Gross Weight.	Dressed Weight.	Dressing Percentage.	Final Gross Weight.	Dressed Weight.	Dressing Percentage.
1.....	1135	568	50.0	1190	648	54.5	1179	622	52.8
2.....	1085	574	52.9	1004	540	53.8	1213	646	53.3
3.....	949	496	52.3	1059	584	55.1	1017	512	50.3
4.....	1159	652	56.3	914	500	54.7	949	496	52.3
5.....	1026	574	55.9	1259	626	49.7	1049	530	50.5
6.....	1014	572	56.4	989	562	56.8	1027	534	52.0
7.....	1045	556	53.2	1071	568	53.0	1039	520	50.0
8.....	1237	668	54.0	1024	540	52.7	1027	536	52.2
Total...	8650	4660	53.9	8510	4568	53.8	8500	4396	51.7

Financial Statement.

Financial statements showing the absolute cost of fattening beef cattle will vary quite materially from year to year. For example the original cost of the cattle, their selling price, the cost of the feeds and the method of management will all be influencing factors. For this reason the following financial statements should not be taken to represent the actual cost of fattening beef cattle, but rather the relative cost depending on

the kind and quality of feeds used as influenced by local conditions. The actual cost per pound of gain should be reduced by using a better grade of cattle, and by using better methods of management. However, the relative cost should not vary considerable from the figures given in the financial statements.



FIG. 7—Steers fed cottonseed meal and corn silage in 1910-1911.

It will be seen from these statements that the value of the manure produced has been credited to each lot of cattle. In considering the necessary selling price to break even on the transaction, however, the value of the manure was not credited. In studying these statements special atten-

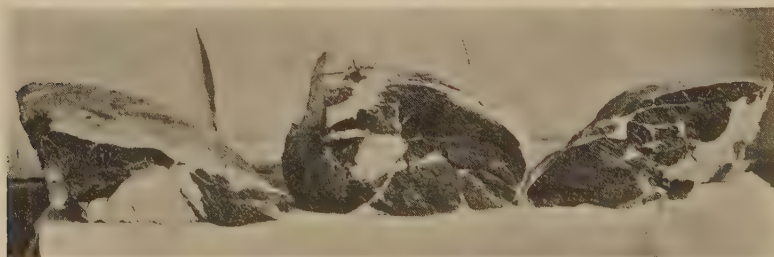


FIG. 8—Porterhouse, round and sirloin cuts from steers fed cottonseed meal and corn silage in 1910-1911.

tion should be given to the profit per steer, and the necessary selling price to break even on the transaction, as these are always the final factors for consideration.

Lot 1. Seven steers fed cottonseed meal, corn stover and corn silage in 1909-1910.

To purchase of 7 steers, weight 6,423 lbs. @ \$4.00 per hundred	\$256.92
To feeding 6,380.5 lbs. cottonseed meal @ \$30.00 per ton	95.70

To feeding 12,950 lbs. corn stover @ \$8.00 per ton....	\$ 51.80
To feeding 18,165 lbs. corn silage @ \$2.75 per ton	24.98
To feeding 2,940 lbs. cottonseed hulls @ \$8.00 per ton..	11.76

Total \$441.16

By sale of 7 steers, weight 7,450 lbs. @ \$5.75 per hundred	428.37
To value of 30 tons manure @ \$2.00 per ton	60.00

Total \$488.37

Profit on lot 1 (seven steers)	47.21
Profit per steer	6.74
Necessary selling price per hundred to break even on the transaction not counting the manure	5.92

Lot 2. Seven steers fed cottonseed meal and corn silage in 1909-1910.

To purchase of 7 steers, weight 6,454 lbs. @ \$4.00 per hundred	\$258.16
--	----------

To feeding 6,380.5 lbs cottonseed meal @ \$30.00 per ton	95.70
---	-------

To feeding 5,915 lbs. corn stover @ \$8.00 per ton.....	23.66
---	-------

To feeding 27,720 lbs. corn silage @ \$2.75 per ton....	38.12
---	-------

To feeding 2,940 lbs. cottonseed hulls @ \$8.00 per ton..	11.76
---	-------

Total \$427.40

By sale of 7 steers, weight 7,510 lbs. @ \$5.75 per hundred	431.82
--	--------

To value of 30 tons manure @ \$2.00 per ton.....	60.00
--	-------

Total \$491.82

Profit on lot 2 (seven steers)	64.42
--	-------

Profit per steer	9.20
----------------------------	------

Necessary selling price per hundred to break even on the transaction not counting the manure	5.69
---	------

*Lot 3.—Seven steers fed cottonseed meal and cottonseed hulls in
1909-1910.*

To purchase of 7 steers, weight 6,627 lbs. @ \$4.00 per hundred	\$265.08
--	----------

To feeding 6,380.5 lbs. cottonseed meal @ \$30.00 per ton	95.70
--	-------

To feeding 6,020 lbs. corn stover @ \$8.00 per ton.....	24.08
---	-------

To feeding 3,272.5 lbs. corn silage @ \$2.75 per ton.....	4.50
---	------

To feeding 14,052.5 lbs. cottonseed hulls @ \$8.00 per ton	56.21
---	-------

Total \$445.57

By sale of 7 steers, weight 7,750 @ \$5.75 per hundred..\$445.62
 To value of 30 tons manure @ \$2.00 per ton..... 60.00

Total\$505.62
 Profit on lot 3 (seven steers) 60.00
 Profit per steer 8.58
 Necessary selling price per hundred to break even on the
 transaction not counting the manure 5.75

*Lot 1.—Eight steers fed cottonseed meal, corn stover and corn silage in
 1910-1911.*

To purchase of 8 steers weight, 7,325 lbs. @ \$4.50 per
 hundred\$329.63
 To feeding 6,065 lbs. cottonseed meal @ \$30.00 per
 ton 90.99
 To feeding 18,600 lbs. corn stover @ \$8.00 per ton.... 74.40
 To feeding 21,180 lbs. corn silage @ \$2.75 per ton.... 29.12
 To feeding 1,480 lbs. cottonseed hulls @ \$8.00 per ton... 5.92

Total\$530.05
 By sale of 8 steers, weight 8,492 lbs. @ \$5.90 per
 hundred 501.02
 To value of 22.5 tons manure @ \$2.00 per ton..... 45.00

Total\$546.02
 Profit on lot 1 (eight steers) 15.97
 Profit per steer 1.99
 Necessary selling price per hundred to break even on the
 transaction not counting the manure 6.24

*Lot 2. Eight steers fed cottonseed meal and corn silage in
 1910-1911.*

To purchase of 8 steers, weight 7,322 lbs. @ \$4.50 per
 hundred\$329.49
 To feeding 6,065.8 lbs. cottonseed meal @ \$30.00 per
 ton 90.98
 To feeding 29,160 lbs. corn silage @ \$2.75 per ton 40.09
 To feeding 7,400 lbs. corn stover @ \$8.00 per ton.... 29.60
 To feeding 1,400 lbs. cottonseed meal @ \$8.00 per ton.. 5.92

Total\$496.08
 By sale of 8 steers, weight 8,424 lbs. @ \$6.00 per
 hundred 505.44
 To value of 22.5 tons manure @ \$2.00 per ton 45.00

Total\$550.44
 Profit on lot 2 (eight steers) 54.35
 Profit per steer 6.79
 Necessary selling price per hundred to break even on the
 transaction not counting the manure 5.88

Lot 3. Eight steers fed cottonseed meal and cottonseed hulls in 1910-1911.

To purchase of 8 steers, weight 7,196 lbs. @ \$4.50 per hundred	\$323.82
To feeding 6,065.8 lbs. cottonseed meal @ \$30.00 per ton	90.98
To feeding 19,352 lbs. cottonseed hulls @ \$8.00 per ton	77.40
To feeding 3,600 lbs. corn stover @ \$8.00 per ton	14.40
To feeding 1,640 lbs. corn silage @ \$2.75 per ton	22.55
Total	\$529.15
By sale of 8 steers, weight 8,500 lbs. @ \$5.725 per hundred	486.62
To value of 22.5 tons manure @ \$2.00 per ton	45.00
Total	\$531.62
Profit on lot 3 (eight steers)	2.46
Profit per steer31
Necessary selling price per hundred to break even on the transaction not counting the manure	6.23

Discussion of Results.

On the whole, the results obtained from feeding steers experimentally have been satisfactory. There is necessity, however, for improvement by making a more rigid selection of feeders. Even with the Experi-

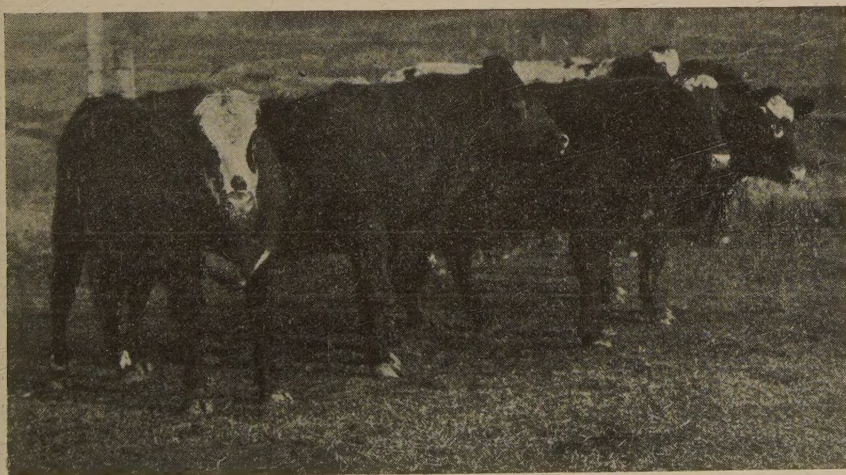


FIG. 9—Steers fed cottonseed meal and cottonseed hulls in 1910-1911.

ment Station cattle, the writer hopes to get the subject on a more practical basis making the profits larger than heretofore, and at the same time derive accurate results from an experimental standpoint.

The financial statements given cover the exact cost of the steers through the experimental period. No account was taken of the feeds used or gains made during the preliminary period. The gains were not large during the latter period, however, as the steers used most of the feed in regaining their original weight.

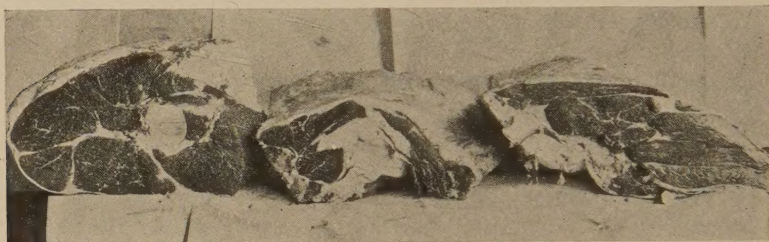


FIG. 10.—Round, porterhouse and sirloin cuts from steers fed cottonseed meal and cottonseed hulls in 1910-1911.

The writer is not fully decided regarding the difference in cost of the gains on the steers fed corn silage, and those fed corn silage and corn stover. Both years the latter ration gave the most expensive gains. The dressing percentage was practically the same for lots 1 and 2, while the difference in the quality of the meat of each lot was not marked. The results show clearly that corn silage is a valuable roughage in the ration for beef cattle. The results obtained are not the same that have been secured under other conditions. It should be remembered, however, that the feeds available for beef production in the South are quite different from those used in other sections which necessitates special work by Southern stations to determine the value of the various feeds and combinations.